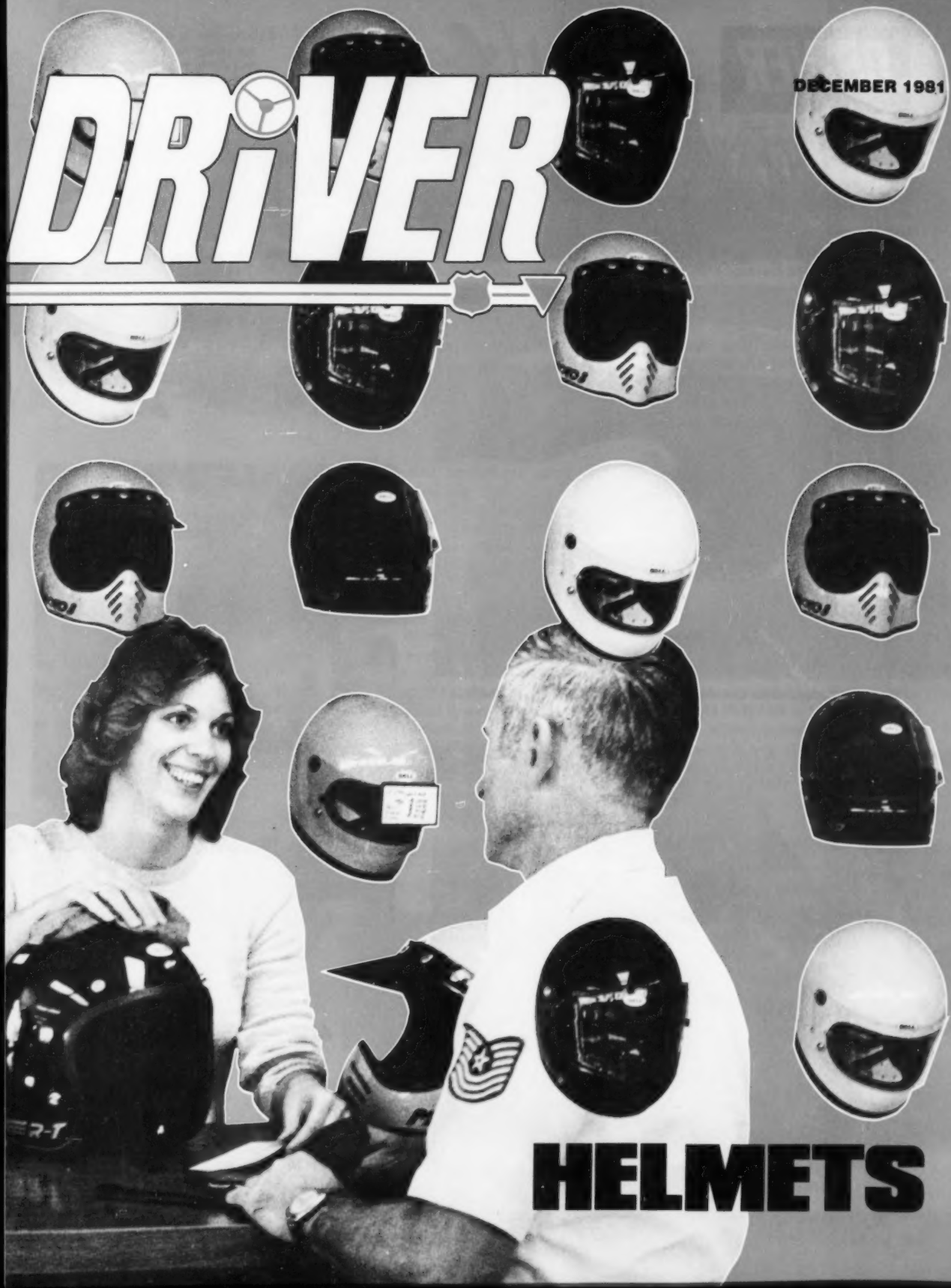
DRiVER

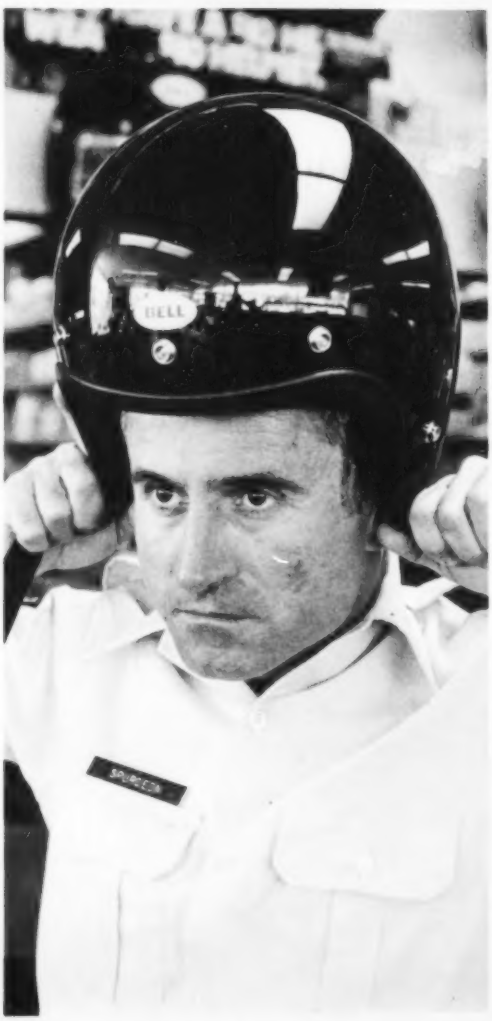
DECEMBER 1981



HELMETS

DRIVER

Before even considering a helmet, make sure it has the D.O.T. label on the bottom edge of the back of the shell.



Helmets that are individually sized usually fit better than those marketed as "Large," "Medium," or "Small."

how to buy a helmet

Helmets are bought just as if they were hats.

The first requirement is that the helmet fit. It should be snug but not too tight. If the helmet is too tight it will begin to hurt and feel very uncomfortable within a very short time of setting out on a ride. A helmet that is too loose can move about and block vision at critical periods. It can also fly off the head during accidents, even when fastened.

To put a helmet on, grasp it with both hands, placing the thumbs inside where the chin straps attach to the shell, spread the shell enough to clear the ears, and slip it on.

With the helmet in place but the strap undone, shake your head from side to side and up and down. The helmet should move a little, but not enough to interfere with vision. Now fasten the strap under the chin as tight as comfort will allow. The opening formed by the strap and the rear of the helmet must be as small as possible to avoid having the helmet come off during an accident. Grab the back of the helmet firmly and try to pull it off. If it comes off it probably would during an accident, too. Look for a better buy.

A note of caution for women with a lot of hair: Don't try to put it all under the helmet. If you do, the helmet will probably not fit correctly and will move around or off during an emergency situation.

Be sure the helmet has a double "D" ring fastener, not snaps. The double "D" ring is much better for adjusting fit, and the helmet stays on.

It is better to buy helmets that are hat sizes rather than those that are marked only Large, Medium and Small. These sized helmets provide better fit and are usually constructed within different size shells. Many of L, M and S helmets use the same size shell for all sizes, varying only the inner liner and padding to achieve the different sizes.

Those individuals who know exactly what size helmet they wear in a brand and style can save money by purchasing mail order helmets. However, if you are a first timer, or are changing brands or styles, it is better to "try before you buy."

The difference between open-face and full-coverage helmets is a personal choice. Of course, if you have ever taken a fall and landed on your face, you already know what full-coverage is worth in terms of your nose, teeth, chin and jaw. Also, those people who have done a lot of long-distance or cross-country riding know that no matter how accustomed you are to being out-of-doors, the wind and sun will blister, burn and dry riders without full-coverage helmets.

Most helmet manufacturers claim their helmets are structurally good for about five years. However, experienced motorcycle riders say that three-years is about as long as you want to keep any one helmet. After that it is of questionable protection.

continued

(above, left)
To put on any helmet, open-faced or full-coverage, spread the shell where the chin straps attach to the shell enough to clear the ears and slip it on.

(right)
A properly fitting helmet will move very little when rocked back and forth. This one is way too large!

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Hon VERNE ORR
Secretary of the Air Force

Lt Gen HOWARD W. LEAF
The Inspector General, USAF

Maj Gen HARRY FALLS, Jr.
Commander
Air Force Inspection and Safety Center

Brig Gen LELAND K. LUKENS
Director
Aerospace Safety, USAF

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THE DEPARTMENT OF THE ARMY
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Dr. FRANCIS S. McGLADE
Director of Safety
United States Army

RADM T.C. STEELE, Jr.
Commander
Naval Safety Center

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DEC

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COL. WARREN L. BUSCH
Chief, Safety Education Division

VIRGINIA HENDRIX
Editor

TSgt RON LATHROP
Technical Editor

JERI ROOD
Feature Editor

ALICE MILKEY
Editorial Assistant

DON KELLEHER
Art Director

LORRAINE HAMBLEN
Staff Artist

CLIFF MUNKACSY
Staff Photographer

THE EDITOR SPEAKS

DOUBLE CLUTCH

HIGHWAY DEATHS GOING UP

NHTSA (National Highway Traffic Safety Administration) predicts traffic fatalities in the United States will be more than 70,000 a year by 1990. Annual deaths in vehicle accidents are now averaging around 52,000. (About 10% of those killed are motorcyclists.)

NHTSA says most of the rise in fatalities will be attributed to an increased number of small cars and an increased number of licensed drivers. Because of a drop in the birth rate which began in the late '60s, however, fewer drivers will be under 25 in 1990. If this were not true, the predictions would be closer to 75,000 deaths per year.

Other causes of climbing fatalities will be an increase in miles traveled per driver, increased use of motorcycles and mopeds, a growing number of heavy trucks, and lagging highway maintenance. The backlog of immediate repairs needed on the interstate system stands at more than $6 billion right now.

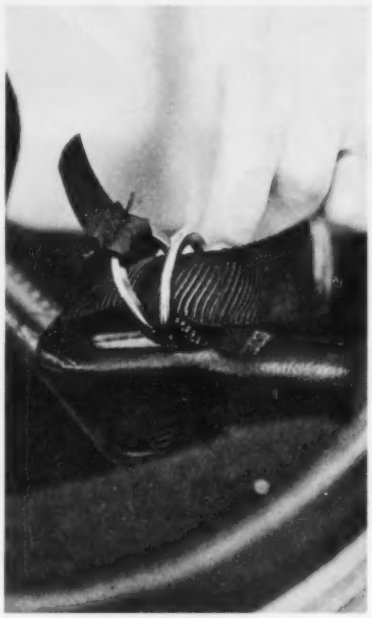
In view of these gloomy predictions, some people find it strange that NHTSA has rescinded the rule requiring passive restraints (air bags or automatic belts) in new cars. The reasoning was this: The rule allowed for either air bags or automatic belts. Auto makers planned to use the belts in 99% of their production. Belts can be detached. NHTSA believes that people do not want to be forced to use a device and so they would detach the automatic belts. Thus belt useage would be no higher than the current 11%.

The NHTSA Administrator says "people have a latent fear of entrapment." Of all the myths DRIVER readers believe about belts the most prevalent is that it is better to be thrown clear of the car in a crash. This is emphatically not true, but such beliefs die hard.

Meanwhile, manufacturers are making manual belts more comfortable, and NHTSA is about to launch a massive media campaign urging Americans to buckle up.

how to buy a helmet

continued



The neck or chin strap is designed to keep the helmet on the wearer's head in the event of an accident. "D" rings such as these are the only good buckle system.

This is the proper way to secure the strap. It should be as tight as comfort permits.

With the strap buckled, grab the back of the helmet firmly and try to pull it off your head. A bargain helmet might slip right off, and in case of accident provide no protection.

Which brings us to another rule of thumb: Don't buy a used helmet; you have no idea what it's been through.

A helmet is actually a one-use item. Once you've "tested" it, it should be replaced. Most reputable manufacturers recommend that after an accident the helmet be returned to them for examination. They'll check for possible shell damage, compression of the non-resilient foam liner, chin strap damage or damage to the chin strap mountings and D rings. They'll send you a written damage report with a price quotation for any needed repairs and await your approval. They usually don't charge for reassembling.

Remember, helmets are designed to reduce head injuries in case of an accidental impact. They do this by absorbing energy through deformation of their materials and, in some cases, progressive destruction of the helmet. Dropping a helmet could be all the impact it needs to use up its one life. If you do drop your helmet, wear an "unused" one until you can get your first-line defense checked out completely.

continued

what are all those labels?

Among the labels inside a good helmet will be the large one saying "1975" or even "1980." That's the Snell approval. The partially hidden Safety Helmet Council of America label (under the thumb) has an individual serial number which is an accurate record of a manufacturer's daily production testing.

The stickers inside the helmets represent a variety of government, industry and private groups with standards and performance requirements. Briefly, these individual stickers represent:

DOT

By law this Department of Transportation sticker must appear on the bottom edge of the back of the helmet. All adult-size helmets manufactured on or after May 1, 1980 (the manufactured date is stamped on the chin strap) must meet the DOT standard, not just the medium sizes (7-1/8 and 7-1/4) as in the past. This Federal Standard now preempts all other standards and applies in all 50 states.

SHCA

The Safety Helmet Council of America is a trade association which oversees voluntary compliance to its standards and quality control. Ivan J. Wagar, SHCA president, says this assures "that the manufacturer is going far beyond his basic obligation under the law."

ANSI Z90.1

This is the American National Standards Institute standard for road users' helmets formulated by a committee of representatives from various groups including consumers' groups, helmet manufacturers, testing organizations and branches of the American Armed Forces.

SNELL 75
SNELL 80

The Snell Memorial Foundation finances its program through the sale of stickers to manufacturers, donations (but not from manufacturers), private sources and government grants. These are dynamic, growing standards that change and become tougher as helmet technology progresses. The Snell 80 standard became effective July 1 and runs concurrently with the Snell 75 standard until July 1, 1982, when the old specifications will be invalid.

construction VS. destruction

Helmets: What do you get for your money?

A helmet-effectiveness graph would probably surprise even the most ardent helmet advocates and literally shock opponents. The difference between using a helmet and not using one would be about three feet apart while the difference between the worst and best helmet might be only two or three inches — at the most!

Despite this, here at DRIVER we still support the old theory: "If you've got a $10 head, get a $10 helmet." So far we haven't found any helmets that cost as much as our heads are worth, but even a $10 helmet will provide a million bucks worth of protection. A full-face, top-quality, approved helmet is still the best way to go, but almost any kind of helmet will help save lives.

Basically, a helmet is an impact-resisting container for the head. This container must prevent objects from penetrating into the head and also absorb impact energy without damaging the brain. It is desirable that the hel-

Basic helmet construction: (A) shell, (B) liner, (C), comfort padding and (D) strap.

met slide easily on hard surfaces and not have edges or parts projecting out that might catch and cause the head to be jerked rapidly about.

It is easy to understand that if an object penetrated the helmet and skull, then brain damage would be all but unavoidable. However, brain damage isn't limited to such penetrations, or to skull fractures and other injuries that produce telltale signs.

Basically, the brain floats within the skull. A heavy blow can actually move the brain within the cranium — the part of the skull containing the brain. Such a force could produce fatal brain damage through cutting, compressing or pulling forces.

To absorb these brain-damaging energies, helmets are constructed with deformable shell and liner. By deforming, the shell and liner spread the force over larger areas and turn some of the energy into heat.

The helmet's hard outer surface — the shell — is intended to resist penetration of sharp objects as well as distribute the forces generated during impact over a wider area. Many materials are used to make helmet shells; however, the best results are obtained with laminated shells. Other

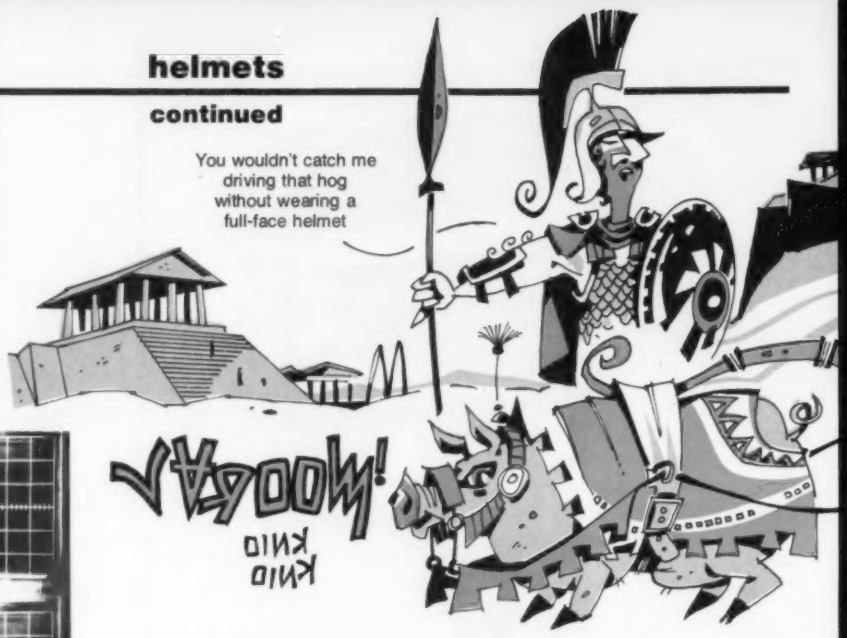
continued

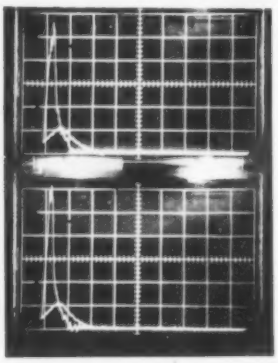
(clockwise from top, right)
Helmets are as varied as the people who need them. There are the space-age, one-hand operated faceshield types **(1);** the basic street or trail rider helmets **(2);** touring helmets **(3);** off-road riders' and racers' lightweight, open-face models **(4);** racers' designs **(5);** and open-face racers' designs **(6).**

A technician calibrates the measuring equipment for a "G"-force rating test.

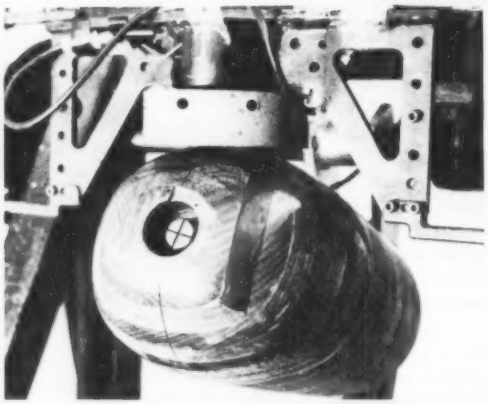
helmets

continued





Initial impact (highest peak) and the follow-on "jolt" of a helmet impact test.



Without a helmet the impact of the test equipment would severely damage a headform.

(right)
The moment before impact.

construction methods include injection-molding various thermo-plastic polymers.

The best shells are hand-laminated using woven fiberglass cloth and polyester resin. A new polymer filament called Kevlar can replace some of the layers of fiberglass to save weight because it has an edge in impact strength performance.

When laminated shells flex during impact, high shear forces develop near the center of the laminate and the bond between the resin and glass sometimes breaks. This delamination can be easily seen by a lighter area on the inside of the shell or sonically detected when the shell is tapped with a metal object. Delamination requires energy — energy that otherwise would have been transmitted to the head.

Polycarbonate and ABS plastics are commonly used in injection-molding helmet shells. Proper manufacturing is required to avoid inherent stresses that crop up in the molding process. These plastics function well and have advantages in being light, inexpensive and easy to work with. However, they are at the same time very sensitive to solvents and, according to the Snell Foundation, offer insufficient impact protection.

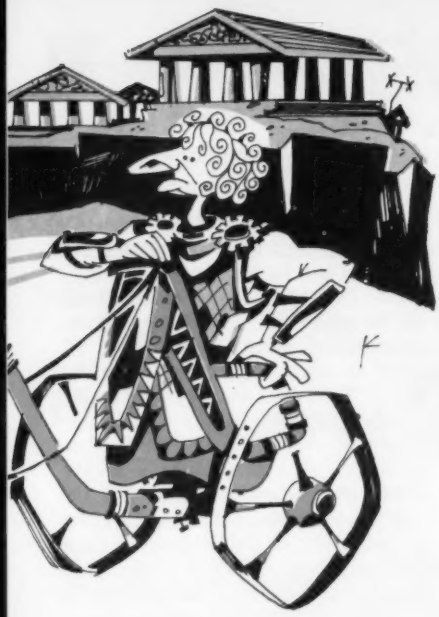
Solvents, including the common chemicals found in any motorcycle or home workshop, weaken polycarbonate shells even more than they do ABS ones. The weakened shells tend to shatter upon impact!

Because plastic shells dissipate energy less effectively than laminated ones, they generally don't pass the Snell Foundation's impact test, let alone Snell's two-blow impact test. In many cases the plastic shells have shattered on the first blow in the testing lab and in use during actual accidents.

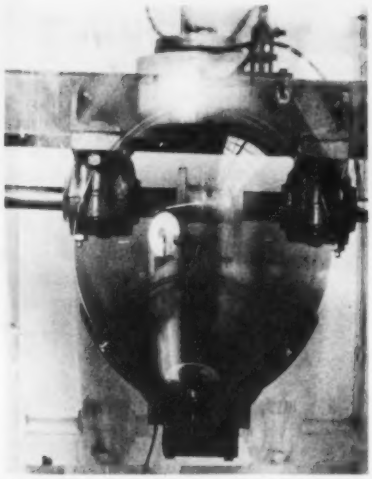
Cold temperatures also seem to be a bitter enemy of plastic shells, especially ABS helmets. The cold seems to increase the shattering tendency.

High-velocity direct blows against helmeted heads seem to be quite rare. Usually a motorcycle rider will strike the deformable body panel or door of an auto, then the pavement. While the rider's forward speed may be considerably above helmet design parameters, the downward velocity onto the pavement is well within design. The horizontal velocity may also cause the rider to roll, tumble and slide — unless a curb, post or other upright fixed object brings a sudden stop to all the motion. Therefore, designers concern themselves with vertical drop onto the pavement.

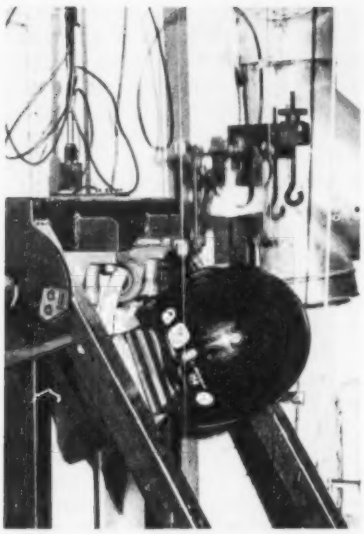
Also quite rare is helmet penetration. Occasionally a foot peg might penetrate a shell though, so it is an important requirement that the shell be fairly substantial.



Photos by MIKE ROBERTS



At impact the helmet appears transparent because of the speed and force of the impact.



When the helmeted head strikes the pavement, the outside shell comes to an almost immediate stop, but the head continues moving. However, the head is cushioned by the crushable liner, slowing down (hopefully at a tolerable G level) as the liner crushes.

Don't imagine that it is the head that crushes the liner as it continues to move after the actual impact. Almost all of the crushing occurs on the shell side of the liner.

If the liner is not stiff enough, the head will "bottom" as it virtually comes in contact with the shell which is already touching the totally unyielding pavement. This very rapid change in velocity brings about a very high acceleration level. If the liner is too stiff, the head will come to a stop too rapidly and experience a high acceleration level. (Editor's Note: In helmetry, the term acceleration is understood to mean negative acceleration — or more commonly, deceleration.)

Expandable polystyrene bead or foam (EPS) is used as helmet liner material because of some unique characteristics. When force is first applied to this "Styrofoam" it acts stiff and crushes very little. After being crushed about five to 10 percent, it begins crushing at a fairly even and mild rate until it reaches 70 percent of its thickness. Then it starts acting stiff again and force must be applied rapidly to get an equivalent amount of crush. Exact values of this force versus deformation can be varied with impact energy, impact velocity, EPS thickness and density.

Now comes the dilemma. Everything a designer does to make a helmet perform well when impacting a small, round object makes it worse when impacting broad, flat objects. The best performance for impacting small, round objects is obtained with a fairly stiff (dense) liner to avoid bottoming.

This helmet awaits delivery of a pointed steel courier.

If, on the other hand, the helmet impacts on a hard, flat surface, the unit load is low and the dense liner resists crushing too much, creating correspondingly high levels of acceleration. A relatively soft (less dense) liner would be best here because it would crush easier, allowing the head more movement for lower G levels. But use the soft liner with the small, round object impact and its low resistance would allow liner bottoming.

The thickness of the liner determines the distance available to bring the head to a stop. The greater the distance, the more gentle the impact. If you wanted a helmet to handle a direct blow of 20 mph and not exceed 150 G's peak deceleration, you'd need a liner 1.5-inch thick. Add to that a quarter of an inch of inside comfort padding and 0.15-inch shell, and you have a helmet extending outward almost two inches from the head. That's a pretty big helmet. So big in fact, that many people would not wear it.

Helmet performance is measured by destroying test helmets under conditions that duplicate some accidents. The same test equipment can be used for all three accepted U.S. standards: D.O.T., ANSI Z90.1 and Snell. The principal difference is the severity of the impact tests.

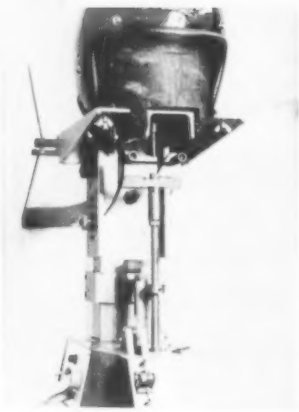
In the tests, a magnesium headform contains an accelerometer for measuring Gs during impact and transmitting this information to other laboratory devices.

The headform is connected via a neck to a guide mechanism that runs vertically on wires or a shaft. The headform is then raised to a given height, dropped and allowed to fall on

continued

The penetration apparatus doing what it's not supposed to: touch the head-form . . . but in this case it is just resting there without a helmet to test.

A technician sets up the chin-strap machine to test the strap and associated hardware. A closer look at the machine (inset).



Quality control includes a water displacement test of the inner liner.

an anvil. The higher it is raised, the faster it is moving when it hits the anvil.

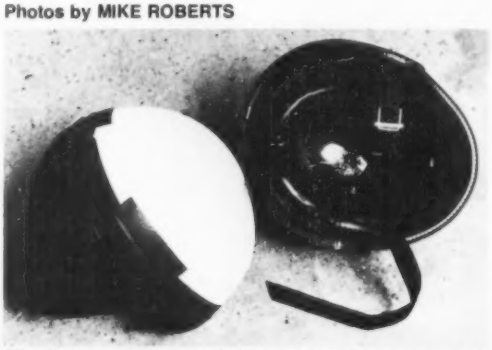
The headform weighs 11 pounds, just over the weight of the average adult male head. The anvil may be a flat steel plate or a baseball-sized steel hemisphere. Both are supported by a 300-pound plate. The neck allows the headform to move so it can impact on the forehead, temple, base of the skull, etc. Some testing equipment drops weighted anvils on the headform.

QUOTE OF NOTE

There's a difference between having the right not to wear a helmet and *not* wearing a helmet. Freedom should be cherished, stupidity should not. Anyone piloting a motorcycle or race car either without a helmet or with one of inferior quality to the best units available today is a candidate for the leading role in Funny Farm Hijinks or The Legend of Ichabod Crane, especially since many leading helmet manufacturers offer levels of head protection not dreamed of 10 or 15 years ago.

Helmet safety
A life and death issue
By George D. Levy
AutoWeek
13 Apr 81

Photos by MIKE ROBERTS



The liner must be separated from the shell for examination after numerous tests.

Allowed to fall onto the anvil without a helmet, the headform would be severely damaged, just as would a human head. The helmet provides the headform a degree of impact protection that can be measured.

The helmet standards place a limit on the maximum acceleration allowable during a test impact. Not all three standards agree on the maximum. Snell has set a 300-G maximum, while DOT allows 400 Gs. However, the DOT tests are further complicated and require a softer liner. DOT stipulates that 200 Gs can't be exceeded for more than two milliseconds, or 150 Gs for more than four milliseconds. ANSI allows three and six milliseconds at 200 and 150 Gs respectively. Snell has no time-duration stipulations.

The most severe test of a helmet shell is dropping the forehead of the helmet on the hemispherical anvil. The most severe test to assure that a liner is not too firm is a side impact on the flat anvil.

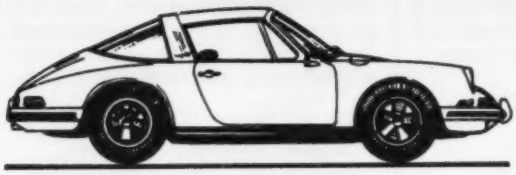
All the current helmet standards in the U.S. use the same penetration-resistance test. The helmet is placed on a metal headform which is solidly mounted on a 300-pound base. A steel dart weighing 6.6 pounds is dropped 9.8 feet onto the helmet. The 60-degree point of the dart must not penetrate the helmet far enough to touch the headform.

A new test involving the helmet chin bar is included in the latest Snell standard. An 11-pound weight is dropped 23.6 inches onto the chin bar which must deflect less than two inches in order to pass.

None of the current U.S. helmet standards include a test of the helmet's ability to stay on the head. However, they all apply a test of the strength of the chin strap and its fasteners. A load of 300 pounds is applied to the chin strap through a pair of rollers which simulate the human jaw. The load is held for two minutes during which the strap must not break, slip, or stretch more than one inch.

Overall, a Snell helmet's ability to deal with impacts is about 20 percent better than an ANSI Z90.1 and about twice as safe as a DOT helmet.

Friendly PERSUASION



Yep, that's right. The dice are loaded. They'll roll only a double five.

The special "55 dice" are a part of a campaign by the California Highway Patrol (CHP) to get voluntary compliance with the national speed limit of 55 miles per hour. The dice, "55-dollar bills," "55" key rings and other items are being used to keep the number 55 before the public eye, and hopefully on their speedometers. CHP officers are giving out the items at information booths, and sometimes to speeders.

This campaign is the result of a federal grant given to the CHP to study the effects of heightened public awareness of the speed limit. The one-year study involves increased 55-mph enforcement along with the public awareness campaign. In the northern counties of the state both enforcement and awareness are being stressed. In the CHP's Golden Gate Division, the area around San Francisco, the patrol is increasing only the enforcement. A third area, the central coast north of Los Angeles, is being studied without either the increased enforcement or the public awareness campaign.

Using this method, the CHP hopes to measure the effect of a public awareness campaign on speeders, and to decide whether enforcement or awareness, or some combination of the two, would be most effective in getting drivers to slow down.

Which do you bet on — the dice or the black-and-white cars?

how's that again...?

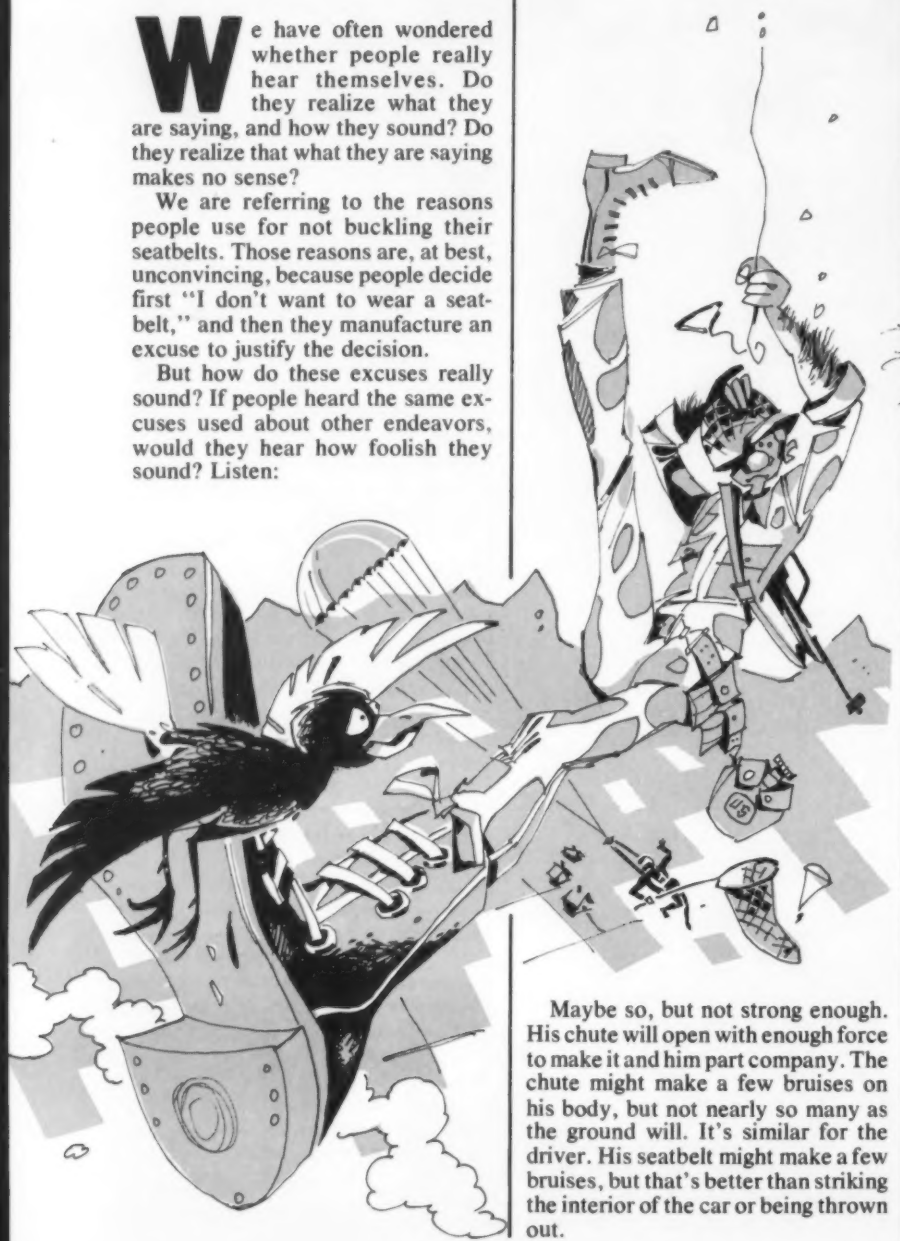
We have often wondered whether people really hear themselves. Do they realize what they are saying, and how they sound? Do they realize that what they are saying makes no sense?

We are referring to the reasons people use for not buckling their seatbelts. Those reasons are, at best, unconvincing, because people decide first "I don't want to wear a seatbelt," and then they manufacture an excuse to justify the decision.

But how do these excuses really sound? If people heard the same excuses used about other endeavors, would they hear how foolish they sound? Listen:

Paratrooper

"The straps on this parachute might hurt me when the chute opens. So I'll just hold onto it with my hands and pull the ripcord. I'm pretty strong."



Maybe so, but not strong enough. His chute will open with enough force to make it and him part company. The chute might make a few bruises on his body, but not nearly so many as the ground will. It's similar for the driver. His seatbelt might make a few bruises, but that's better than striking the interior of the car or being thrown out.

Football Player

"If I were knocked unconscious while wearing all that junk, I couldn't get out of the way of that 275-pound tackle. So I'll skip the pads and helmet for extra speed and mobility."

Of course, without the protective equipment he is much *more* likely to be knocked out. Just like the car driver — without his seatbelt to hold him in place, he is thrown around in the car and is more likely to be knocked unconscious. With the belt, he stays conscious and can get out of the car quickly in case of emergency. By the way, fire or submersion in water occurs in fewer than one out of every 200 car crashes, so these dangers are overemphasized.

Mountain Climber

"Ropes? Never use 'em. If you slip, it's much better to fall free of the mountain."

Yes, he's crazy. He may "fall free" but the sudden stop at the bottom will end his climbing career. The same goes for the driver who thinks it's better to be "thrown clear of the car" in a crash. He is 25 times more likely to be killed than if he stays inside the car. If he's thrown completely out, he can be killed by hitting the ground. If he is partially ejected, the car may roll over him.

Space Shuttle Astronaut

about to go on extra-vehicular activities

"I don't need that spacesuit. I'm not going very far."

Maybe not, but he'll probably find outer space will take his breath away. He's safe only inside the suit. The driver is safe only inside his belt, no matter how short a distance he is driving. Most accidents happen close to home, and a lot of them occur at intersections, so you need belts even if you're "just going to the corner for a loaf of bread."

Scuba Diver

"I won't use that scuba tank because the straps are too confining and they're uncomfortable."

He might have a point if he didn't need the tank to breathe, and if the straps weren't adjustable, but he does and they are. Likewise, the straps of the seatbelt are adjustable for the comfort of the wearer. Granted, they may confine the wearer a little, but they feel better than a mouthful of steering wheel. And, with use, the wearer will feel much *more* comfortable with the seatbelt than without it. Try using it for a week without fail and see if that isn't true.

We hope we've made our point: Learn to distinguish between valid reasons and excuses. We think you'll see that there aren't any valid reasons for failing to buckle up.

tteecc!h! double tech with tsgt ron lathrop

COMMENT: I've heard that by using a dwell/rpm meter and a vacuum gauge you can do a better job of setting the timing on an engine than can be done by using a timing light. If this is so, what's the procedure?

REPLY: In my book using a vacuum gauge is one of the better ways of checking engine performance. The problem with using a timing light is that it depends on how accurate the timing marks are.

To set the timing, first make sure that all the ignition parts are in working order. After the engine has warmed up, set the dwell. On most engines, the vacuum advance line to the distributor must be removed and plugged, but check the vehicle's manual to be sure. Now adjust the idle speed to specifications. Then check the vacuum reading. It should be reading steady between 17 and 22 inches, although some newer four and six-cylinder engines deliver acceptable performance at 15 inches. There is a drop of one inch for each 1,000 feet above sea level.

OK, advance the distributor a little and readjust the idle rpm (it will speed up when you advance the timing). If the vacuum reading is lower than before, you've passed ideal timing. If it is higher, advance the distributor again and adjust the idle to specification again.

The idea, of course, is to get the highest vacuum reading you can at the specified idle speed. A complete guide to using a vacuum gauge is in the January 1980 DRIVER.

COMMENT: A friend saved me $40.93 of a $48.30 bill that, had he not overheard my problem, I would have paid to a local motorcycle parts dealer. My fairing's headlight's dim bulb had burned out, leaving me with only no light or bright light. When I visited the motorcycle dealer I was shocked to learn they wanted $46 plus tax for a replacement headlight. I asked if they had anything cheaper, including whether it might not be cheaper to just replace the whole fairing (I thought that *was* a joke). No go. Even the round units that would fit into the fairing's rectangular opening were at least $35 *and up!* Choking on that, I bugged off to do some shopping around.

The cheapest headlight I saw advertised for the fairing was $36. I was complaining about this in a telephone conversation when my friend overheard me and — please forgive the pun — enlightened me on how to save a few bucks on the dealer's quoted costs. To make a long story shorter, he noted the shape, voltage and part number of the headlight that was on my bike, went to the local discount store just off the base (he's a civilian, so he couldn't check the BX service station), and bought a headlight having the same specifications for $6.94 plus tax. He switched the new light for the bad one in just under two minutes flat. The new bulb works just fine.

The trap I fell into (and I'll bet I'm not the only one) was thinking that just because it was a motorcycle headlight it was different than an auto headlight. The motorcycle parts dealer did nothing to change this line of thinking (and I can't blame him, considering his evident profit margin).

But reflection brought up some questions I was hoping you'd answer. Is there really any difference in motorcycle and automobile headlights? Did he get the wrong headlight with my original buy of the fairing?

REPLY: Basically, one headlight is much like another, providing it is the correct size for the mounting and has the correct functions (with quad-lights, two of the four units have high-beam functions only). While your friend didn't get you the wrong headlight, he might not have gotten you the best one for your type of riding. Probably the bulb that was originally in the fairing and the replacements that you saw were halogens. Compared to normal U.S. bulbs, they are extremely bright and because of the extensive work in making the lens spread the light just so, they can be very expensive. If you are NOT a high-speed rider and don't worry about filling in the dark areas left by cheap lens work, the inexpensive bulbs will do fine. However, the halogen lights are much brighter and, as a rule, provide a better light pattern and spread. The dealer's mark-up was probably not that much.

COMMENT: In the July 1981 DRIVER reply to the question whether big tires are dangerous the statement was made that because they put so much more rubber on the road they improve braking. I'm not sure that this is really the case.

A larger tire does have more area in contact with the road; however, the flotation is increased — that is, the weight on the tire per square inch of road contact area is reduced. So even though the road contact surface has increased, the braking force has decreased so that the two actions tend to cancel each other out and the net result is that the stopping distance of the vehicle is probably about the same as it would be with original equipment tires.

What leads me to this conclusion is the fact that the vehicle stopping distance of a specific vehicle is independent of the vehicle's weight (as long as the design limits of the brakes are not exceeded). This means that a fully-loaded truck and the same truck empty will stop in the *same* distance starting from the same speed.

Few people realize that weight is not a factor and will insist that the heavier vehicle will take longer to stop "because it just makes obvious sense."

The reason this is so goes back to my original question concerning the braking effectiveness of wider tires. The effect of increasing the weight of the vehicle affects the more normal force (more weight per square inch on the tires in contact with the road) thus increasing the braking force. So the deceleration of the vehicle is not affected by the weight of the vehicle. As the weight goes up, the braking ability goes up also. So although it is heavier, it is offset by the increase in braking force available.

REPLY: Read on.

COMMENT: I feel the same way you do about wider tires, but I have some questions about it which physics doesn't seem to agree with. I've never been able to reconcile my education

with my gut feelings about these answers to these questions.

Road friction depends upon the normal force and the coefficient of friction. So it apparently doesn't matter how much rubber you have on the road. And the amount of rubber on the road is a function of the tire pressure (assuming no load taken by side walls of the tires which in most cases is negligible anyhow). In other words the weight of the car divided by the pressure in the tires equals the footprint area. Why do large tires behave so much better for braking?

Here's hoping you can answer this. I have a bunch of ideas but nothing by which I can win arguments.

REPLY: You've both assumed something to be constant that isn't: the coefficient of friction (Cf). Because a wider tire has more contact area and less load per square inch, a softer (or, if you will, stickier) compound can be used. Because there is more rubber you still get the same tire mileage while the larger area also helps dissipate the greater heat generated.

H. W. Kummer and W. E. Meyer have done the most research and developed the most complete theories about tires (Unified Theory of Tire and Rubber Friction, University Park, Pa.; Pennsylvania State University, 1966). However, their work is about as far beyond most tire engineers as quantum mechanics is beyond most kindergartners. Basically, rubber generates friction by a combination of mechanical gripping of irregularities and the molecular adhesion between the rubber and the irregularities.

Because of the "black art" of tire production, a tire with only 500 pounds resting on it can often generate 700 pounds of friction force. This ratio of force/weight is call Cf. The Cf of most standard street tires is from 0.8 to 1.0, while racing tires — and the newer breeds of wide street tires — are capable of generating 1.0 to 1.4 Cf.

Temperature, slip, camber, pressure and loading have a great deal of effect on how well the tire "works." For now, let's just say that it is important to have the tires at the proper pressure — that pressure at which there is an even rubber pressure in contact with the road across the contact patch. Because rubber is less able to resist frictional shearing forces, the load on the tire greatly affects the Cf. The same tire that has a 1.4 Cf on a 2000-pound car may have 1.3 Cf on a 3000-pound car.

Basically, stopping power is generated by two friction surfaces transforming energy into heat. The energy a brake system must absorb is a function of vehicle weight and speed change. The equation being: ft-lbs = (weight) x (top speed^2 – minimum speed^2) x (.0335). For example, a 2000-pound car braking from 55 mph to stop must absorb and dissipate 202,675 foot-pounds of energy.

If that energy can't be dissipated before the brakes are applied again there will be a net temperature rise in the brakes until it stabilizes where braking input equals cooling output (1000 to 1500 degrees Fahrenheit). At that point the brakes lose friction capability (fade), the brake materials start burning, the brake fluid boils and the rotors crack and fly apart.

Therefore, if we increase the overall weight of the vehicle, the brakes are going to have to absorb more energy to stop the vehicle in the same distance. They might do it once or twice in a row, but after that the heat build-up could easily "exceed design capacity."

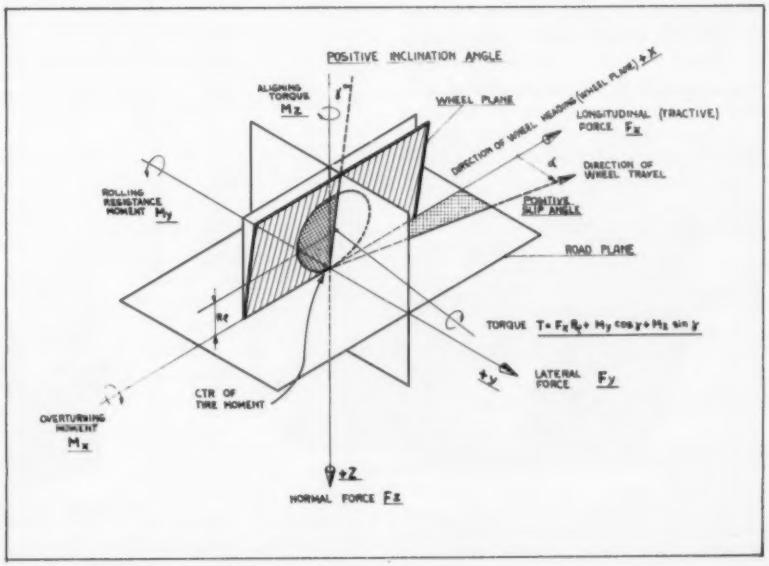
The amount of stopping force a given set of brakes can generate is equal to the pedal force times the mechanical force ratio times the friction material coefficient times the brake disc application radius times the quantity one divided by the tire radius.

EDITOR'S NOTE: If you have a general interest automotive comment or question that you would like a reply to, and feel others could use the knowledge also, send it to:

DOUBLE TECH
HQ AFISC/SEDD
Norton AFB, CA 92409

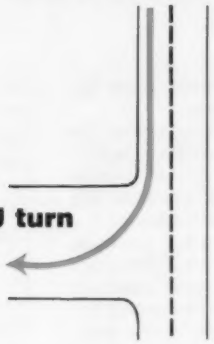
Be sure to include all available information which may help in finding the correct solution.

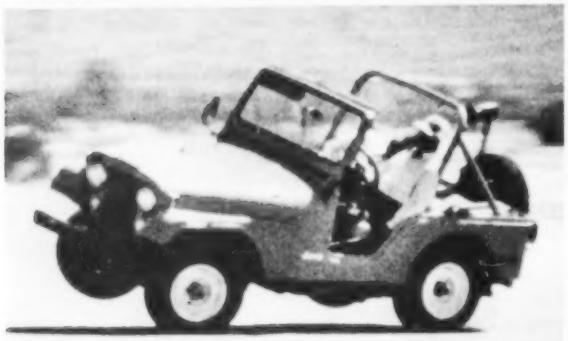
Technological input behind a tire's output.



At 22 mph, a 1980-model Jeep CJ-5 begins a 90-degree turn to the right, as shown in the diagram.

Photos courtesy of Insurance Institute for Highway Safety

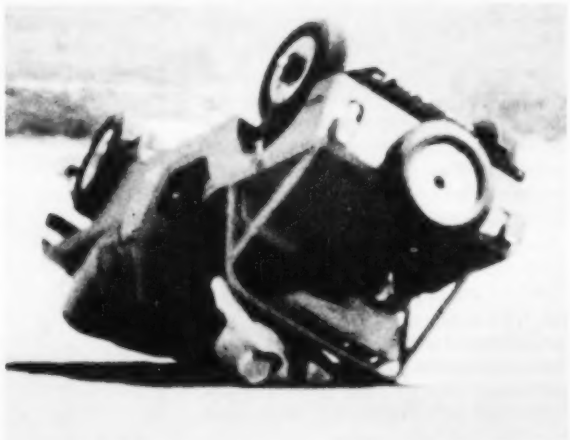




The vehicle is past the midpoint of the turn and its right wheels have lifted off the ground.

As the vehicle completes the arc of the turn, it is teetering on two wheels and rollover is imminent.

As the vehicle rolls on its side, the unbelted dummy passenger is thrown across the driver.



The restrained driver and the unrestrained passenger are smashed onto the pavement.

Rollover ACCIDENTS JEEP CJ-5

The CJ-5 is a modern version of the World War II military jeep. It is a four-wheel-drive vehicle with a high clearance meant to give it off-road as well as highway use. The high clearance, coupled with a relatively narrow tread and a short wheelbase, results in a vehicle which has driving characteristics that are different from those of regular passenger cars.

Utility vehicles have the highest rate of involvement in single-vehicle rollover crashes, and American Motors Corporation Jeep CJ-5 is at the top of the list. In 1980, the Insurance Institute for Highway Safety (IIHS) had an independent testing facility in Phoenix, Ariz., perform a series of handling tests of the CJ-5. The pictures we show here were taken during one segment of the testing, the "J-Turn." The vehicles traveled on straight, dry, flat asphalt pavement and were steered into 90-degree turns — simulating sharp right or, if continued, U-turns. In the other test, an "obstacle avoidance" maneuver, vehicles traveling on the same pavement were steered to the left in order to avoid an obstacle in their right-of-way, and then sharply to the right in order to return to the right-of-way once the obstacle was passed.

Three 1980 Jeep CJ-5s rolled over in the J-turn maneuvers, all at speeds of 22 mph. Three 1980 CJ-5s rolled over in the avoidance maneuvers, all at speeds no greater than 32 mph.

In contrast, a 1980 Chevrolet Chevette put through the same maneuvers at these and higher speeds showed no tendency whatever toward rolling over. The Chevette was chosen for comparison purposes because sub-compact cars, such as the Chevette, have the highest rollover rates among passenger cars. Rollovers for all types of passenger cars are much less frequent than for utility vehicles. A research study performed by Calspan for the Department of Transportation concluded in 1978 that it appears to be extremely difficult to roll over a modern passenger car by steering and braking maneuvers, even at speeds near 50 mph.

American Motors Replies: When DRIVER asked American Motors Corporation for their comments on the 1980 tests of the Jeep CJ-5, AMC said: "Even though the speed at which the vehicles were tested was relatively low, the maneuvers performed by the mechanical driving devices* were hardly routine or even emergency maneuvers. During the tests the steering wheels were turned much further than required; no braking or deceleration was allowed; no steering corrections were made; and lateral acceleration forces were created that far exceeded those experienced by a human driver in almost any vehicle. The tests were simply not representative of a human driver's reactions and abilities in a normal or emergency situation."

Another study: This past fall the CJ-5 was the subject of still another report, this one done by the Highway Safety Research Center (HSRC) at the University of North Carolina. The HSRC study dealt with rollover crashes of passenger cars, pickup trucks and utility vehicles and was based on data from Maryland, North Carolina, and the federal Fatal Accident Reporting System. Specific utility vehicles studied included the AMC Jeep CJ-5, Ford Bronco and Chevrolet Blazer. Pickups in the study were Ford F-100 and F-150, Chevrolet C-10 and K-10, Toyota and Datsun.

"In virtually every category of comparison — crash involvement

continued

**Ed. Note: The CJ-5s were operated by Automated Vehicle Control systems during the tests. The systems steered, accelerated and braked the vehicles to insure that no risk of human injury was associated with the tests.*

continued

rates (particularly single vehicle crashes), serious driver injuries, rate of overturn, serious driver injuries in rollover crashes, serious injuries for belted and unbelted drivers — the Jeep CJ-5 had the least favorable results of the various vehicles studied," the researchers reported.

Personal injury claims: DRIVER also notes that the Jeep CJ-5 had the worst report of personal injury claim frequency results for 1977 through 1980 model utility vehicles according to the Highway Loss Data Institute. The Jeep Cherokee's claim frequency was 22 percent better than the all-vehicle average, but the Jeep CJ-5 claim frequency was 122 percent worse than the average, with the frequencies rising to three times the average for claims with medical costs exceeding $1,000. Utility vehicle results were part of a report also covering vans and pickup trucks. As a group the pickups had the lowest claim frequencies, vans next, followed by utility vehicles. (The Volkswagen Kombi-Campmobile had the worst results for vans and the Chevrolet G20 Sportvan (¾-ton) had the best. For pickups, the Subaru Brat had the worst results and the GMC C2500/K2500 (¾-ton) had the best.)

What's it to you? We don't expect you to be surprised by the fact that utility vehicles are easier to roll over than ordinary passenger cars. Even if you've never driven one, the narrow track width and higher center of gravity are obvious. Our purpose in publishing this material is to convince you that if you're going to drive any utility vehicle you must develop new skills and techniques for on-road driving as well as off. Trouble can come to those who jump from their Ford Mustangs or Mazda GLCs directly into a Chevy Blazer or Jeep CJ-5 with no study or practice driving sessions.

Knowledge of the vehicle and what it can and cannot do is essential. Please read the driving tips included here. American Motors Corporation provided them to us with the CJ-5 specifically in mind, but they will be extremely valuable to you no matter what utility vehicle you plan to operate. The smart driver is almost always the accident-free driver.

Old photos from our files show rollover isn't a new problem.

tips for On-Road driving

For the JEEP CJ-5 (and other utility vehicles) from American Motors Corporation

Know your vehicle: Learn specifically how to drive your vehicle on pavement! Start slowly and practice in an area where you can become familiar with its unique characteristics. There may not be much body lean in some turns because the vehicle suspension is different from a car's suspension. This makes a big difference. Body lean is one of the things that make you aware that centrifugal force is at work. A few practice sessions and you will realize there are things you can't expect your Jeep vehicle to do on pavement, just as there are things you wouldn't expect your family car to do off road.

Driver and passengers should be secured at all times by the restraint system: The essentials of open-bodied vehicles are a sturdy rollbar and seatbelts. Combined, these two items reduce injuries from impacts with the vehicle interior and exterior objects.

Avoid sharp turning maneuvers: Small utility vehicles have higher ground clearance and narrower track to make them capable of performing in a wide variety of off-road applications. Specific design characteristics give them a higher center of gravity than ordinary cars. They are not designed for cornering in the same fashion as conventional 2WD vehicles any more than low-slung sports cars are designed to perform satisfactorily under off-road conditions. An advantage of higher ground clearance is a better view of the road allowing you to anticipate problems. If at all possible, avoid sharp turning maneuvers.

Approach curves cautiously, slowly: The proper speed at which to take a curve is determined in part by the centrifugal force that will be exerted on the vehicle. Because of your Jeep 4WD vehicle's higher center of gravity, the effects of centrifugal force are different from those experienced with a typical car. Therefore, you should always approach curves at normal driving speed. You should not attempt to go as fast through turns as you might in a low-slung sports car, or perhaps even your family car.

Slow down in crosswinds: Strong gusting winds hitting the side of any vehicle can affect stability. Driving slower under these conditions will minimize the effects and give you more control.

Off-Road driving

Guidelines for CJ5 from American Motors Corporation

Off-road operation is what your Jeep vehicle was designed to do. Under almost all conditions engage 4WD. But as you leave the pavement behind, you should be guided by the principle that although your 4WD vehicle might be able to go almost anywhere, there are places you shouldn't go. Use common sense and remember that driving situations and conditions change quickly out there, so be alert and be prepared. As a general rule you should go where others have gone before. There are plenty of 4WD trails or unimproved roads to take you to the great outdoors. In fact many of the surfaces you'll travel will be unpaved, with a sand or gravel base or a surface that rain has turned to muck. These surfaces call for different driving techniques from paved roads.

Sand: Sand or dirt roads that are dry and dusty are often characterized by "loose" or "soft" shoulders and curves, while the crown of the road may be rock hard. Ideally you should have all four wheels on the solid surface, so drive as high up on the crown as possible while staying on your side of the road. You may want to drive in third gear (or in second range if you have automatic transmission) and you should proceed slowly and cautiously, avoiding abrupt steering changes. Also, be alert for rutted or choppy road surface, especially the kind of surface that might cause your vehicle's wheels to leave the ground. As a general rule, on pavement or off, keep your vehicle in a situation where at least three wheels are on the surface at all times.

Mud: Driving in mud is similar to driving in snow. When a hard-packed dirt road is wet from rain there's a slick film of mud on the top that can cause loss of traction even in 4WD mode. Keep a very light foot on the accelrator and a fingertip touch on the steering wheel. Ride high up on the crown of the road and stay away from sudden maneuvers that could cause you to slide toward the shoulders where the mud may be several inches deeper. If your vehicle begins to slide, take your foot off the accelerator and steer in the direction of the slide until control is regained.

In hub-deep mud, as in heavy snow, the objective is to maintain your momentum. Use your lowest transmission gear or range and keep a steady foot on the accelerator pedal and a firm hand on the wheel to maintain your direction. Above all, don't stop. Drive at a steady speed even with the wheels spinning. Of course, mud or snow tires would give extra bite.

Gravel: Your vehicle will perform very well in 4WD mode on graded gravel surfaces. Maintain a moderate, steady speed and firm control of the steering wheel, avoiding sudden maneuvers that could cause the vehicle to slide. Stay on the crown of the road as much as possible, because gravel at the edge may be looser and the footing less stable. If your vehicle does start to slide, take your foot off the accelerator and steer in the direction of the slide until you regain control. Allow yourself enough distance to stop, using a combination of light brake tapping and engine compression.

In loose gravel, as in deep snow or mud, you should maintain your momentum. Use your lowest transfer case mode and keep a steady foot on the accelerator, and a good grip on the wheel for directional stability.

Driving off-road on steep inclines and sidehills: Before reviewing how to drive up steep hills and along sidehills, make note of an important point. If you don't make it to the top, or your vehicle is about to slide or roll sideways, stop, turn off the engine, put it into first gear, put on the parking brake and get out and walk down. An ounce of prevention is worth a pound of cure.

Steep inclines: When preparing to climb a steep incline, first try to find out what you're up against. What's on top? Walk the course to make sure you know. And if you don't think you can make it, don't try it!

Also, it's always a good idea to make at least one exploratory run before the final attempt. This lets you feel out the surface and assess how much effort is going to be required to go over the top. (Low range

continued

Proceed with care on roads with a pronounced slope to the shoulder: All roads are designed with a "crown" or high center so water will drain off the surface. Occasionally you may find yourself on older, resurfaced, narrow, two-lane roads with a higher-than-normal crown. These roads can cause an exaggerated lean by driving close to the crown, without crossing the highway divider. If the road is also winding with a lot of dips and rolls, you may have to drive more alertly and slowly.

Regularly check and maintain your vehicle equipment: Keep your vehicle in top running order. Make frequent routine checks of the vehicle's steering system, power train, brakes, springs, shocks and above all, tires (both tread and air pressure).

Road conditions and surfaces affect the way you drive: Your on-pavement driving will involve a variety of paved surfaces, each requiring somewhat different handling responses from the driver. There are super highways and country roads, city streets and sometimes-rough rural roads. Some surfaces are concrete, some are asphalt-layered, smooth or pebbled, and some are barely blacktopped. Weather conditions affect all these surfaces, calling for still more alertness and skill on the part of the driver.

On-pavement driving in adverse weather: When the road surface becomes difficult to travel because of deteriorating weather conditions such as snow or heavy rains collecting on the roadway, you should shift into 4WD. Whenever the conditions call for slow speeds and high traction you will want to use the versatility of your "on-demand" 4WD system. You should continue to proceed slowly and cautiously. Be alert to the problems fellow drivers around you may be having that could create a hazardous situation for you.

Snow: In wet, light snow it is important to maintain traction by making slight or gradual changes of speed and by maintaining a light touch on the steering wheel. Avoid sudden maneuvers. If you should start to slide, stay off the accelerator and steer in the direction of the slide. Once the vehicle straightens out, lightly accelerate to get back on the line you were traveling. Drive slow and allow plenty of room to maneuver between yourself and the vehicle ahead. If you must brake, use a light, tapping action. Engine compression can help slow you down. It's also wise to use a lower gear under these conditions.

In heavy snow, maintaining momentum is the key to safe going. Try to keep moving by using the lowest possible range in your transmission and a steady accelerator pedal. Special snow tires can help. Under special conditions chains on all four wheels can provide additional help. Never drive with chains on the front and not on the rear.

continued

These versatile vehicles don't handle like ordinary passenger cars. Learn how to make J turns, U turns, negotiate S curves. Knowledge and practice are your keys to accident-free driving, on and off the road.

and first or second gear.) When the tires begin to spin, apply a little extra gas and let them dig in slightly. Then you can clamp on the brakes and hang there in the dug-outs while you shift into reverse and drive back down. That's right — in reverse gear, clutch out and driving. Absolutely not in neutral and trying to let yourself down on the brakes. And to avoid sideroll remember never turn your vehicle sideways on a hill or steep incline.

On your attempt, give yourself a running start. Accelerate to the hill and then, just as you approach the top, ease off the gas. You do this for two reasons. First, it's never a good idea to crest a hill at full power. The second is that, very often, this lets your bouncing, scrambling vehicle settle down to grind out the over-the-hump traction that's needed. So, accelerate, scramble and then ease off!

Getting down can be as tricky as going up. Maybe trickier. Keep the vehicle heading straight down hill, in gear (low range/first gear) and under control. If it begins to slide, as it will on a steep enough grade, touch the gas to regain steering control, then let off the gas. Don't lock up the brakes. You can't steer a skidding wheel. Touch the gas instead. It'll straighten you out. Locking the brakes can only get you into trouble.

Sidehills: Traveling across the side of a hill is extremely hazardous. It should not be attempted. If it is absolutely necessary on a hill which is not very steep it should always be done with extreme caution. Whenever possible, avoid doing it! And too, when you're getting out of your vehicle on a sidehill, be sure to exit on the uphill side.

Surfaces on sidehills are deceptive. You may have been running along a ridge that seemed perfectly solid but once you got onto the sidehill it wanted to slip out from under you. The problem comes from the fact that when you're driving across a side slope the vehicle's weight is transferred to the lower side. Instead of having the weight distributed to four tires, it's almost all on two. This makes the vehicle want to slide down the hill sideways.

When it starts to slide, there's only one thing you can do, and you have to do this instantly, of course: turn downhill! This helps transfer the weight to both front wheels and stop the slipping — and it could save you from rolling over.

Once you're angling downhill, take care not to lock up the wheels and start sliding out of control.

Driving off-road on rock and sand: Before discussing driving on rocks or sand, one caution is necessary. After you've driven in rocky or sandy situations, your brakes should be inspected for any residue in the lining. Heavy-duty

maintenance is suggested as the lining wears out quickly if not cleaned after such uses.

Rock: The basic technique for driving in rock consists of four letters: S-L-O-W. Low range. Crawl Up. Creep down. And even that is sometimes too fast!

If you have automatic transmission, then use your brake to ease yourself down off that rock you so deliberately climbed up. With a manual transmission, let it walk down the rock against engine compression. You'll kill the engine occasionally, but that's the way to do it.

If you have a choice between driving a wheel over a large rock or letting the rock go under the vehicle, always put the wheel on it. Squarely on it. Then you know where the rock is and that isn't going to high-center you or damage your vehicle undercarriage.

If you do get high-centered (hung up on an object that lifts one or more wheels from firm contact with the ground and keeps you from going on), the first thing to try is to back off. If this doesn't help, then you have to get serious about solving the problem. This means jacking up the wheel that isn't getting a grip. Under this wheel you stuff rocks, dirt, wood, brush, whatever. You do this until, in effect, the road has been built up to the point that you can drive off the offending object. Then move the vehicle — SLOWLY — after removing the jack.

Sand: The technique for driving in sand involves two or three principles, the most important of which is stay on top of it. You can do this by having big tires, or by greatly reducing the pressure in your normal-size tires. Remember — if you do reduce tire pressure and drive on deflated tires you risk premature wear on the tread. Also make sure that whatever tires you use are approved by the vehicle manufacturer.

If you have a short patch of soft sand to be crossed, you can usually rush it and make it across. Study the situation, decide where you're going to go, then back up, take a little run at it and move through at a steady pace, not stopping, not making abrupt changes of direction, and not hesitating on the way.

If you're into serious sand — a sand wash you're going to travel, or dry loose sand at the beach, or some big dune — and don't have oversize tires, there's a likelihood you're going to need to let air out of your tires. The reason for this is that a soft tire is better able to conform to whatever surface it encounters than is a hard tire. So a soft tire will develop grab-on and provide go-ahead traction where a hard tire won't.

The tire should be less than 10 psi. So soft you can see a definite bulge in the sidewall where it's in contact with the surface. With flabby tires you can travel sand with relative ease. (Don't forget to reinflate when back on hard land! Just a few miles on pavement could cause substantial damage to your tires.)

If driving on an ocean beach be sure to thoroughly wash under carriage to prevent corrosion.

Driving off-road in mud and rain.

Mud: The problems encountered in mud are somewhat similar to those of driving in snow in that there's both a reduction in traction and an increase in resistance to forward motion.

A contributing problem is that mud comes in a wide variety of consistencies that range all the way from light, greasy clay to a thick, liquid bog. All of them require slightly different driving techniques.

In general, though, what they require is well-controlled go-ahead power. In most instances this means low range and either first or second gear depending on the mud's particular characteristics.

So when you come to a muddy stretch, get into the lower gear and keep in mind that you don't want to lose headway. Once you're committed to the bog, don't stop, don't hesitate, don't change your mind halfway through. Churn, churn and keep churning until you're on firm footing again.

At the other extreme is a slick film of clay. Here you use some of the same techniques as driving on ice. Especially staying on or near the crown of the road.

Rain: Ordinary rain creates no conditions that require special techniques from the driver of a four-wheeler. Except extra caution, of course. Unusually heavy rain can lead to conditions where special driving techniques may be needed, however.

Floodwaters always demand extreme caution. Driving into unknown water is like walking around blindfolded. That drop-off may only be an inch or two. Or it may be a precipice.

When it is necessary to drive through deep water, get into low range and maintain a steady, slosh-ahead pace. Be very careful about stopping broadside in a stream of running water. Running water exerts immense force against anything as flat-sided as an automobile and this could result in the vehicle being swept downstream with the current.

Even when only a few inches of water are running, don't stop if you're on an unpaved surface. Moving water may wash the footing out from under your tires and make it impossible for you to get underway again. (The same principles apply if you're driving along the beach and get caught by a wave.) Don't stop. Keep moving. Head for the higher ground.

You probably already know about riding wet brakes to help them dry out but have you considered the effect that sand and silt can have on brakes, wheel bearings and the like after running through muddy water? It's always wise to give them a thorough inspection after exposure to such conditions.

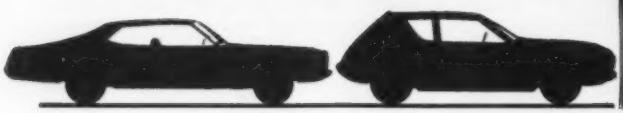
Driving off-road on snow: Snow can be troublesome in different ways. When it's either hardpacked or soft-melting it can be slick. This creates a traction problem. At other times, it can get so deep it piles up in front of the tires and resists their progress. This gives you a problem in maintaining headway.

When the snow is slick, drive it like any other slick condition. That is, a light touch on the steering wheel, make gradual changes in throttle opening to avoid breaking traction and don't do anything sudden. Don't let a slide start. And if it does, catch it.

But let's say it's nice dry snow. But deep. Then what do you do? If it's deep enough to provide more than minor resistance, put the vehicle in a lower gear. Low range is even better. Then shove your way through and try to hit a happy medium between spinning your tires and keeping headway not to bog down. A nice, even, steady pace is always best.

If you have to break trail in deep snow and are going to use chains, it's not a bad idea to put them on the front wheels. At the low speed you'll be moving, the chains will help the steering as well as the go-ahead traction. But in normal circumstances, never put chains on the front unless you also have them for the rear. If you have to brake hard with chains only on the front, the rear wheels will lock and slide, making the rear end want to come around.

ordinary DRIVERS



Not all of us are expert drivers. We do our driving to get us to work and run errands. We drive to get to destinations, and only rarely for the pleasure of driving itself. We consider driving more as a right that everyone has than as a privilege that demands skill. We don't think much about it, we just do it. For these reasons we are all more or less ordinary drivers.

Ordinary doesn't mean especially bad, but it doesn't mean especially good either; it's just average. If you like to think of yourself as an above-average driver, read on. The following is a portrait of ordinary drivers. It may start you thinking. We hope so.

Skill: Most ordinary drivers were taught to drive by friends or their parents. Those unofficial teachers enabled them to pass the license test,

but they may have left their "students" with some bad driving habits, such as riding the brakes, or they may have failed to teach something important, like checking the mirrors before opening the car door.

No matter who taught them to drive, ordinary drivers have forgotten a lot of the facts they learned from the driver's handbook. They studied the book for a short time and crammed for the test. Then they began to forget what they had read. Ordinary drivers do not usually reread the driver's handbook because they reason "I know how to drive."

Reflexes: Ordinary drivers do not have the fast reflexes of the Grand Prix driver. For ordinary driving they do not need them. However, they put themselves in places where quick reflexes could be vital — they follow other cars far closer than the space margin allowed by the two-second rule; they change lanes quickly and without warning; they brake to a stop only at the last moment.

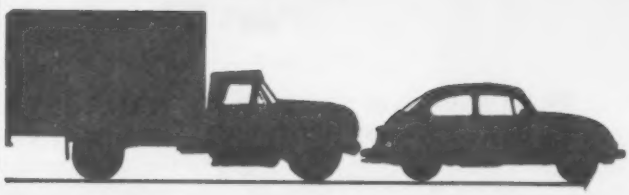
Condition: Ordinary drivers are not in top physical condition, for the most part. Most do very little running or vigorous exercise, and they do not walk any place they can reach by car, even if that place is close by.

Along with this, ordinary drivers do not pay much attention to their present condition — whether they are in good shape to drive. They may drive when they are sleepy in the morning and would rather be in bed. They may drive on a vacation far into the night when they *should* be in bed. Ordinary drivers do not rest periodically to regain their peak driving condition.

Ordinary drivers are not careful about driving when they are using drugs (of any kind) or alcohol. They think they can drive well enough no matter what they're on.

Carelessness: Ordinary drivers are careless in other ways too. They do not wear their seatbelts, always using some excuse like "It's too much trouble." They do not make their children wear belts either — they do not even make their children sit down in the car.

Ordinary drivers do not watch for sudden hazards when they drive, like car doors opening, or children running into the street. So instead of anticipating, they must do emergency



maneuvers to avoid these hazards.

Ordinary drivers have a very short attention span. They will watch their driving only until something else catches their eye — a store window, a billboard, perhaps the color of the sky. Further, they will try to do other things while they are driving. They will talk, smoke, try to select a station on the radio, even search for something in the glove compartment or try to read a map.

Worse than that, ordinary drivers don't think about what they are doing — they drive automatically. They will drive for blocks, or even miles, with no memory of having done it. They think about work, bills, personal problems, dates, what's for dinner, or what's on TV.

Technique: Ordinary drivers waste a lot of gasoline by speeding. They speed much of the time, and almost all of the time on highways. They take off rapidly from stoplights, continuing to accelerate until they reach the next intersection, where they brake heavily to stop the car. They turn too fast, often taking curves on highways so fast that they go over the center line.

They take unnecessary risks. They speed up when approaching yellow lights, and they sometimes run red lights. They drive too fast in parking lots. They turn left in traffic without waiting for a gap of several seconds. They turn right on red lights without stopping. They change lanes without signaling or checking their mirrors, and without allowing those around them adequate space. They sometimes pass other cars on curves or hills.

Ordinary drivers follow other cars too closely at all times, but especially on freeways. They don't think about the two-second rule — allowing a two-second space "cushion" in front of them, for emergency stopping or other maneuvers.

Courtesy: Ordinary drivers sometimes lack courtesy. They wait until the last moment before they signal for turns, or they fail to signal at all. Then, after the turn, they fail to cancel the signal, making those around them wonder what they're up to. They do not allow merging traffic room to enter on freeways. They often take the right of way from others.

Maintenance: Ordinary drivers do not take adequate care of their cars. They only change the oil and keep the car exterior clean. Maintenance becomes a worry only if the car breaks down.

Attitude: Ordinary drivers are impatient and practice a "me first" attitude. They pull out in front of others without a thought, but they get very angry when the same thing is done to them. They become annoyed when anything interferes with their movement, like heavy traffic.

Beliefs: Finally, ordinary drivers have a couple of beliefs of which they may not be aware. They believe they are better drivers than most others. And they believe there isn't much of a chance they will have an accident.

Perhaps these beliefs explain why ordinary drivers do all of the other things we listed. Perhaps they would pay more attention to their driving and be more careful if they realized they are much closer to "just average."

WHAT'S that NOISE?
Part Three

Unusual noises that cars make are often annoying and distract attention from driving. Even minor distractions such as "pinging" can cause near misses, minor accidents and sometimes major accidents.

Often these unusual noises are indications of items needing maintenance or repair. Interpreting these audible clues is a major undertaking for any backyard mechanic and something all drivers should attempt to understand.

In the October and November 1981 DRIVERs we listened to general engine and drive train noises. In this installment we'll turn our ears to sounds unique to certain American Motors, Chrysler Corporation and Ford Motor Company vehicles. In part four of "What's That Noise?" we'll concentrate on General Motors cars.

AMERICAN MOTORS

GENERAL VALVE TRAIN NOISE

1970-79 Cylinder head obstruction may be causing push rods to rub or contact the head.

1970-77 Excessive wear on rocker arms or bridge pivots.

VALVE TRAIN CLICKING

1973 Six-cylinder models with prior to engine code 412 (A or E) 01. Non-hardened push rods may be causing this condition. Check for bluish-black discloration at each end of the push rods. Replace those rods which are NOT discolored.

VALVE TRAIN SQUEAKING

1973 six-cylinder models with build code 606 (A or E) 27 and stamped rocker arms. Incorrect tappets may have been installed causing premature valve train component wear.

EXHAUST NOISE

1970-72 V8 models. There may be an exhaust leak at the exhaust manifold that cannot be corrected by tightening the exhaust manifold bolts. Replace all bolts with new interference thread (wax coated) bolts, part #8121628.

KNOCKING FROM REAR OF VEHICLE

1976-77 Foreign matter in the fuel pump may be holding the inlet valve wafer open. Replace the fuel pump.

CLUTCH PEDAL PULSATION & NOISE

1974-75 models with 150 T three-speed manual transmission. There may be excessive clearance between the throwout bearing sleeve and transmission front bearing cap.

HEATER MOAN

1979 Spirit, Concord, AMX eight-cylinder models. Mistakenly diagnosed as automatic transmission noise. Installing a nylon restrictor (AMC part #3219619) into the heater core inlet tube corrects this problem.

CHRYSLER CORP.

BACKFIRE, SPARK KNOCK, ROUGH IDLE

1973-75 Defective Exhaust Gas Recirculation (EGR) valve.

1974 Hose connections to the Coolant Controlled Exhaust Gas Recirculation (CCEGR) valve located in the radiator top tank may be incorrect.

1975 440-cubic-inch engines. Check timing and carburetor float level to insure they are set to specifications.

1976-77 400- and 440-cubic-inch Electronic Lean Burn vehicles equipped with 100 amp alternators. Condition may be caused by electrical interference to the spark control computer from the charging system.

SPARK KNOCK, DETONATION

1978 318-cubic-inch, four-barrel carburetor engines. There may be a high amount of vacuum to the spark control computer. To correct, install a vacuum reducer valve in the vacuum hose four inches from the vacuum transducer end.

1979 Federal 318-cubic-inch, two-barrel carburetor engines. Engine timing is advanced. Change engine timing advance from 16 degrees before top dead center (BTDC) to 12 degrees BTDC.

BACKFIRE, KNOCK UPON HEAVY ACCELERATION

1978 high performance 440-cubic-inch Furys and Monacos. Add a vacuum reducer and retainer (Chrysler part #4131208) to the vacuum hose of the spark control computer.

DETONATION ON ACCELERATION

1978 318-cubic-inch, two-barrel carburetor. Torque converter lockup speed is low. Remove and service transmission valve body. This may also correct a driveline vibration.

BACKFIRE, MISFIRE, BUCKING

1977 400- or 440-cubic-inch engines equipped with Electronic Lean Burn (through September 1976). Infrequent crossfire causes condition. Install a new-type reluctor, part #4091277.

ALTERNATOR WHINE

1970-76 Heard at all levels of radio volume. This is caused by the Electronic Voltage Regulator (EVR). Correct by installing a capacitor, part #3501598.

"Don't laugh Sonny, I've kept her humming all these years because I KNOW what those noises mean."

ALTERNATOR WHISTLE OR WHINE

1979 Heard at all levels of radio volume in vehicles eqipped with Electronic Search Tune Radio. This may be caused by insufficient filtering in the unswitched radio lead. To correct, install a Filter Choke Assembly (part #4048495) in series with unswitched lead of radio.

continued

continued

BEARING NOISE

1975 with air conditioning. If noise is at idle speed, decrease the air conditioning drive belt tension to correct.

EXCESSIVE TIMING CHAIN NOISE

1979 Arrow, Colt with 2000 or 2600 cubic centimeter (cc) engines. The chain and/or tensioner is improperly adjusted. Correct by installing spring tensioner (part #MD022235) and rubber washer (part #MD021242).

EXHAUST PIPE RATTLE (CHATTERING)

1976 Colt at 2000 to 3000 rpm. The exhaust pipe heat shield is vibrating against the exhaust pipe.

DISK BRAKE SQUEAL

1970-75 occurring on pedal application. This is caused by:

- Front wheel bearings are out of adjustment;
- Pad assemblies are vibrating with shoe;
- Rotors are deeply scored; or
- Pads are severely worn.

1978 Horizon, Omni. A severe front brake squeal may be caused by the type of brake linings used. Install new brake linings (part #4176767) to correct. When installing the new linings, replace the rubber bushings in the calipers and apply a small amount of grease (supplied with the new linings) to the bushings and guide pins, also.

1978 Challenger, Colt, Sapporo. A high-pitch squeal may develop when applying the brakes lightly at speeds below 40 mph because of a vibration of the shoe and lining assemblies. Remove the front caliper assemblies and disk brake pads. Measure the thickness of the outer and inner pads together. If the total pad measurement is less than 1.2 inches, install square shims (part #MB150749) on outer pads and round shims (part #MB150748) into piston pocket. If the total pad measurement is more than 1.2 inches, file the pad linings to obtain a 1.2-inch measurement.

DIFFERENTIAL CHATTER, MOAN

1970-76 models equipped with "Sure-Grip" differential. Change differential lubricant to part #3744994.

REAR SHOCK ABSORBER TOPPING OUT

1975 This distinct noise develops because some models were built with rear suspension higher than designed height. Replacing the rear shock absorbers should correct this; however, in severe cases the springs will have to be changed.

FRONT SUSPENSION KNOCK, GROAN

1977 Charger, Cordoba, Fury, Monaco. This may be the result of a mislocated shock absorber clearance hole which causes interference between the front shock absorber upper bushing retainer and crossmember near upper control arm support bracket.

SPEEDOMETER NOISE, FLUTTER

1977-77½ Aspen, Volare, Diplomat, LeBaron. There is a poor cable connection at the instrument panel caused by a bent retainer clip.

1977 (Hammering noise). This is caused by cable core misalignment because of improper engagement into the transmission pinion which forces the core up into the speedometer head or speed control servo.

TRANSMISSION CLICK OR CREAK WHEN SHIFTING

1978 Omni, Horizon with automatic transmission. When shifting between drive and reverse there is a click or creak in the engine compartment. This is caused by excessive clearance between the engine mount and its bushing and can be reduced by shims.

LOW-PITCHED RUMBLE DURING ACCELERATION

1977-78 225-cubic-inch, two-barrel carburetor-engined Aspen, Diplomat, LeBaron, Volare. The throttle cable is transmitting engine noises from the engine compartment to the passenger compartment. Replace the throttle cable with a new "looped" design throttle cable (part #4027789).

FORD MOTOR COMPANY

AIR CLEANER NOISE

1978 Fairmont, Zephyr equipped with 200-cubic-inch (3.3-Liter) engine and automatic transmission. The pulse air valve to the air cleaner is defective and may also cause poor performance and unstable idle. Replace the pulse air valve and any lines to the air cleaner that may also be defective.

DETONATION

1975½-76 Models with EGR exhaust backpressure control system. This is caused by a leaking or nonfunctioning exhaust backpressure transducer assembly.

1976 2.3-Liter engine. Replace 105 degree Fahrenheit carburetor air cleaner temperature control sensor assembly with a new 75 degree assembly.

1978-79 Fairmont, Zephyr with 3.3-Liter engine. The flex tube between the air cleaner and the zip tube at the fender apron is disconnected. Fasten the flex tube to the air cleaner duct with a rivet and to the zip tube with a self-tapping screw.

1978 2.3-Liter engine. Timing marks may be incorrectly stamped on the crankshaft pulley. Inspect the timing mark on the camshaft sprocket aligned with timing pointer on the inner belt cover. If the crankshaft pulley mark is not at zero degrees top dead center (TDC) plus or minus one degree, replace the pulley and set timing to the specifications indicated on the engine decal.

1979 Non-turbocharged 2.3-Liter engine. May also suffer unsatisfactory driveability if the black-and-white fuel separator has been damaged by contact with the EGR valve. Install a new fuel separator using only 5.5 inches of white-stripe hose connected to the white end. The black end should be toward the carburetor with the port on the black end below the port on the white end.

IGNITION NOISE IN RADIO

1977-79 To correct this, apply GE Silicone Grease G-627 (or equivalent) to the tip of the ignition rotor outboard of the plastic area only. Do NOT apply to any other area of the rotor.

NOISY STARTER, NO CRANK

1970 Mercury, Montego, Courgar except 429 and 460 cubic-inch engines. Starter drive end housing bearing is worn.

1974 2300 cc engine with four-inch starters. Starter plunger lever tangs may be disengaged from the drive shaft.

1974 with four and one-half-inch starters. The plunger lever may be binding against the slot in the drive housing. File the slot removing approximately one-sixteenth inch of metal from the housing for clearance.

VALVE TRAIN NOISE (SIMILAR TO VALVE TAPPED NOISE)

1970 351 cubic-inch "C" engines. Oil deflecting baffles inside the rocker arm cover are contacting the rocker arms.

ROCKER ARM CHIRPING, SQUEAKING

1975-77 351 "M," 400, 460 cubic-inch engines. Locate faulty rocker arms and replace rocker arm and fulcrum with new aluminum fulcrum (part #D7AZ-6A528-B).

ENGINE WHINE

1974 2800cc engine. Interference between the crankshaft gear and oil pan may be causing the noise. Replace the oil pan with a newer model (part #D4ZZ-6675-A).

ENGINE TICKING

1974 Thunderbird, Mark IV without thermactor. Noice is being transmitted through the accelerator and transmission shift cables.

1979 Capri, Fairmont, Lincoln, Mustang, Zephyr with 2.3-, 2.8- or 5.0-Liter engines. Noise is heard while accelerating. To eliminate the noise, remove the right front engine mount and install a nylon spacer under the restrictor pin washer on the upper surface of the engine mount. After reinstalling the mount, recheck.

ENGINE KNOCK, HOT

1975-77 460 cubic-inch engines. The knock is loudest at 800 to 1500 rpm. It is caused by excessive bearing clearance at the number one main bearing.

1978 Fairmont, Zephyr with 200 cubic-inch engine. The knock comes from the fuel pump area because of pulsating fuel in the line. To eliminate this noise, insulate the line with a piece of soft rubber hose at the fuel line retainer clip behind the inner fender panel at the lower end of the front fender.

EXHAUST NOISE, ROUGH IDLE

1977 Federal 460 cubic-inch engine. There is a vacuum leak between the carburetor spacer and intake manifold at the right rear corner.

EXHAUST WHISTLE

1976 351 "M," 400 cubic-inch engines. Whistling is at tailpipe during acceleration. This can be corrected by drilling a nine-sixteenths inch hole through all diffuser screens as close to the center as possible. The diffuser assembly is located at the rear of the tailpipe and may have two or four screens.

DRIVELINE RINGING

1974 Capri with 2800cc engine and manual transmission. The ringing occurs in third and fourth gears at 2000 to 2400 rpm. The sound is a harmonic resonance occurring in transmission components (gear noise) that is carried by the drive shaft. Although there is no malfunction indicated by the noise, it can be bothersome. The suggested solution is to install a one-piece driveshaft with insulation.

DISK BRAKE SQUEAL

1971-73 Capri. The disk brake pads have been redesigned to eliminate this squeal. The new pads have a rubberized backing (caliper piston contact side) and a new P-shaped shim. Do NOT use any anti-squeal lubricants with these pads.

CLUTCH TAPPING

1971-74 Capri. The noise is most apparent between 2000 and 2500 rpm but only when the clutch pedal is in the fully-released position. Begin by checking the clutch pedal adjustment and clutch cable tension spring. If both are satisfactory, the transmission must be removed. Then remove the clutch lever and release bearing assembly. Working from the rear of the housing, drive out the pivot pin. Then install a new sleeve (part #E834054-5) and new pin (part #E840201).

FRONT END KNOCKING

1976 Capri II. When this occurs over rough roads it's caused by insufficient hydraulic valving in the front shock absorber units.

FRONT END THUMPING

1977 Mark V. This noise happens at about 40 mph or on rough roads. It is caused by a loose stone deflector. Make sure the deflector's retaining clips are installed and positioned properly.

THERMACTOR AIR PUMP NOISE

1977-79 These units are not completely quiet when in operation. Allow a minimum of 500 miles for break-in so the pump can seat and lap in.

AIR CONDITIONER MOAN OR RUMBLE

1977-79 The suction hose is touching the speed control servo bracket on the dash panel. To stop the noise, install a length of foam hose around the suction hose inside the clip over the speed control servo.

EXHAUST SYSTEM IDLE BOOM

1978 Fairmont, Zephyr. To eliminate this noise, install damping weights on either side of the tailpipe hanger. Four or more exhaust clamps installed together may provide this weight.

a bunch of the boys

were whoopin' it up
At a snow-bound western zoo
The kid in charge of the monkey house
Was tootin' a tin kazoo
And watching the fun from a tree in her cage
Was a lady gorilla named Lou

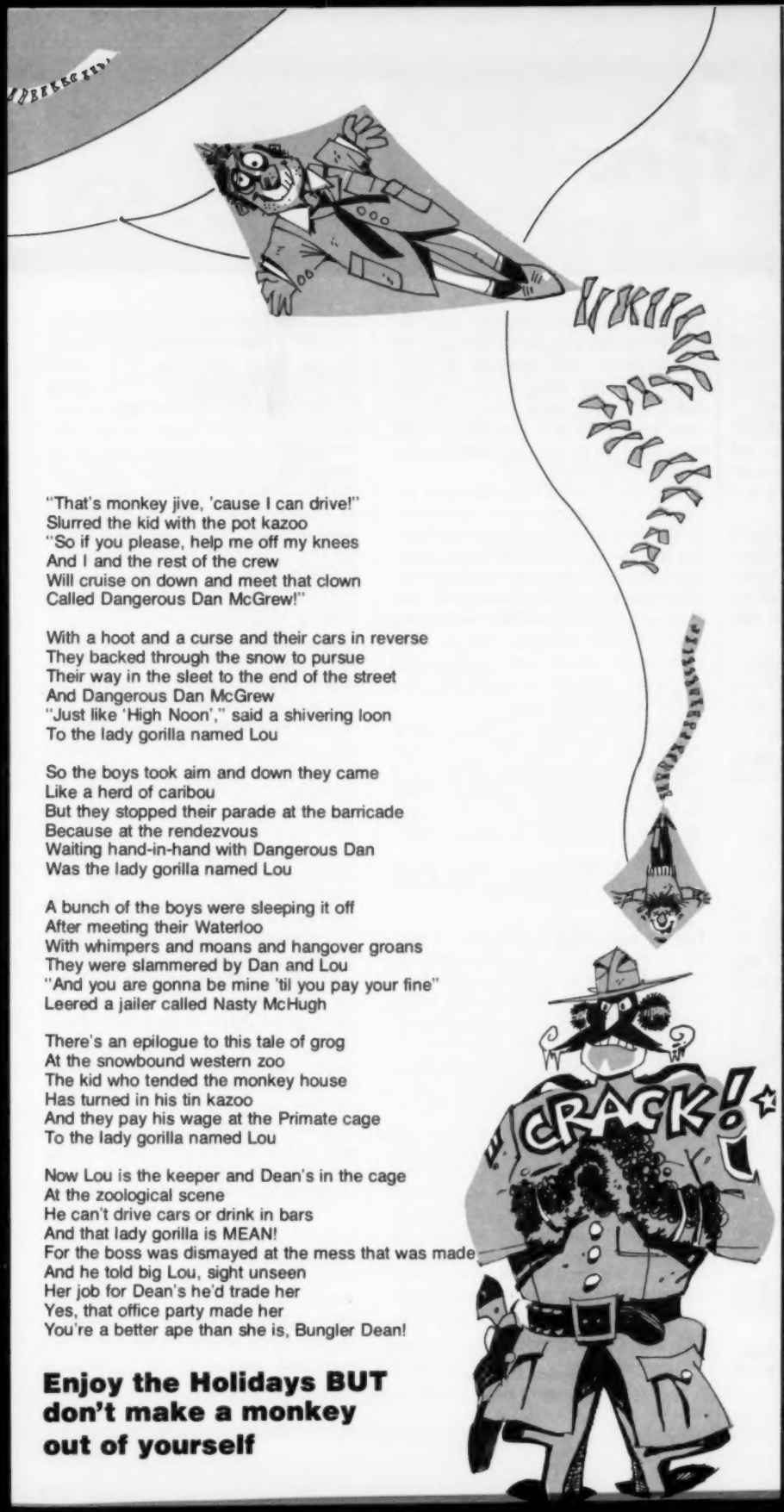
An office party was going strong
At the snow-bound western zoo
Where the season's greetings were mixing well
With vodka and mountain dew
And watching the boys who were higher than kites
Was a lady gorilla named Lou

The time was December, the month you'll remember
When office parties fall due
And meek little guys with bloodshot eyes
Drink bubbly from out of a shoe
And gagging away on her perch in the tree
Was the lady gorilla named Lou

The party went on 'til the crack of dawn
When the boys broke it up and withdrew
To the parking lot where they dimly thought
They'd drive home from the booze-drenched zoo
And scampering down from her nest in the tree
Came the lady gorilla named Lou

The drunks were caught in the parking lot
By a stern and irate Lou
Who got mighty mean with a guy named Dean
(The kid with the tin kazoo)
"That kazoo's full of pot and you're gonna get caught
By Dangerous Dan McGrew!"

"Y'all better walk, 'cause a big road-block
To catch drunken drivers like you
Is just down the street and the cop on the beat
Is Dangerous Dan McGrew!
You've drunk up your bail and you'll rot in jail"
Warned the lady gorilla named Lou



"That's monkey jive, 'cause I can drive!"
Slurred the kid with the pot kazoo
"So if you please, help me off my knees
And I and the rest of the crew
Will cruise on down and meet that clown
Called Dangerous Dan McGrew!"

With a hoot and a curse and their cars in reverse
They backed through the snow to pursue
Their way in the sleet to the end of the street
And Dangerous Dan McGrew
"Just like 'High Noon'," said a shivering loon
To the lady gorilla named Lou

So the boys took aim and down they came
Like a herd of caribou
But they stopped their parade at the barricade
Because at the rendezvous
Waiting hand-in-hand with Dangerous Dan
Was the lady gorilla named Lou

A bunch of the boys were sleeping it off
After meeting their Waterloo
With whimpers and moans and hangover groans
They were slammered by Dan and Lou
"And you are gonna be mine 'til you pay your fine"
Leered a jailer called Nasty McHugh

There's an epilogue to this tale of grog
At the snowbound western zoo
The kid who tended the monkey house
Has turned in his tin kazoo
And they pay his wage at the Primate cage
To the lady gorilla named Lou

Now Lou is the keeper and Dean's in the cage
At the zoological scene
He can't drive cars or drink in bars
And that lady gorilla is MEAN!
For the boss was dismayed at the mess that was made
And he told big Lou, sight unseen
Her job for Dean's he'd trade her
Yes, that office party made her
You're a better ape than she is, Bungler Dean!

Enjoy the Holidays BUT don't make a monkey out of yourself

HOW IT HAPPENS!

Three people are riding in a two-seater sportscar. A female airman first class is sitting on the lap of a civilian passenger. The driver, a senior airman, has been drinking. Driving in excess of 50 mph in a 35 mph zone, the driver loses control on a curve and drives off the road, hitting a tree head-on. The senior airman and the civilian suffer broken bones and minor injuries, but the airman first class sitting on the passenger's lap receives severe head injuries and dies the next day. The driver is charged with driving under the influence.

We don't know which was dumber — drunk driving, or carrying three people in a car with only enough room for two. Either way, they were an accident looking for a place to happen.

BACKFIRE

LETTERS to the EDITOR

SHOULD THERE BE A LAW?

I just read your "Double Clutch" in the July 1981 issue. I think there should be a law requiring people to wear their seatbelts at all times. I wear them all the time, whether I'm on base or off. I feel the same way the girl in your column (on a bus without belts) felt. If I'm not wearing my seatbelt, I don't feel right.

I don't think people will wear belts unless they are stopped by a policeman and issued a ticket for not wearing them. I think that we should be like the Germans and use their rule for not wearing seatbelts.

Well, I hope you can use my letter for the issue on seatbelts and making it a law to wear them. They can save lives!!

A1C Kimberly A. Casada, USAF
Hampton, VA 23669

This letter is in reply to your article on "Should There Be A Law?" concerning the wearing of seatbelts (July '81 DRIVER).

As an Air Force recruiter, I am required to wear my seatbelts whenever I am driving a government vehicle. This is a very good habit which I and my family use when driving my family car. I feel that once the habit is developed it is second nature to hook-up before driving, or being driven. I do feel that a seatbelt law would help Americans get into the habit. I would not resent the state or nation telling me what to do in my personal vehicle. In my opinion, to do as the Germans do would be an extreme measure, but some kind of measure would have to be taken in order to drive home the point of the importance of wearing seatbelts.

Let's hear about unrestrained infants and toddlers!!! Thanks for caring.

SSgt Preston Conner, USAF
Fort Worth, TX 76115

I just finished reading the July '81 DRIVER and enjoyed it as usual. In reference to your column on seatbelts, I firmly believe that by not doing anything more positive to insure belts are worn, the government is costing me money in additional insurance premiums.

I enforce the use of seatbelts in my cars and this practice paid off recently. My 16-year-old daughter was driving her 11-year-old sister home from the base and another vehicle ran through a yield sign, crashing into the front left-hand side of my car causing about $3,000 damage. While both girls were "shook up," neither girl sustained injuries as seatbelts and harnesses were in use.

I returned from a tour in Germany within the last year and I feel that their law is outstanding. Money is a great motivator and if people would be forced to pay for their own negligence it would cost me less in insurance.

Lt Col John J. Heller, USAF
Jacksonville, AR 72076

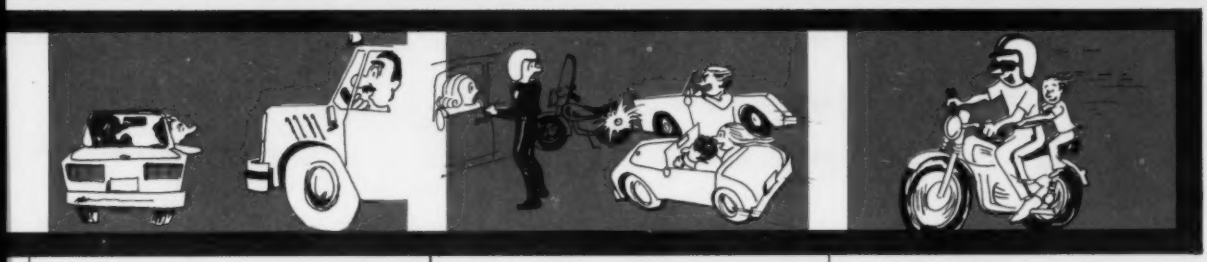
First, I would like to compliment you on your magazine. I and numerous other Air Force civilian employees read it regularly. Probably the most popular argument against mandatory seatbelt usage is that government should not require anyone to protect himself. I might agree with that argument if no one else were involved, which is not the case. Thousands of people live with the agony of having been responsible for an accident which killed or maimed someone. In most cases, the injury or death would have been avoided if everyone had been wearing seatbelts. If we do not require use of seatbelts (or even if we do), no driver should be liable for the death or injury of anyone who was not belted.

Mr. James R. Arnold, USAF
Sheppard AFB, TX 76311

In response to your July '81 "Double Clutch" I have a little story I would like to share with you. Two years ago, my best friend and I were going to school at our nearby high school, but first we were going to stop at a convenience store and get a couple of sodas for the coming day. This was the first time I had ridden with Brent as we usually took my car because it used less gas. When we got back in the car at the store, Brent noticed that I didn't have my seatbelt fastened. He told me to put on my seatbelt before he went anywhere.

I commenced to tell him all the reasons that I shouldn't wear it but I finally gave up when I saw that he was serious. As we pulled out of the parking lot I looked around in time to see a huge dump truck barreling down on us. It must have been doing 70 mph I remember thinking at the time (the police report put the speed at 65 mph in a 30 mph zone). Brent turned the wheels sharply and managed to avoid a head-on collision. The truck struck the car on the right side and flipped it over three times. As the car stopped I remember thinking, "Oh God, I hope Brent is all right!"

I looked at the driver's side of the car and noticed that Brent was in pretty good shape. About that time I heard the sound of sirens and in a few minutes the sound of metal being cut. Brent said that he felt all right but that his legs were pinned. In about 30 minutes the paramedics had us free and into a waiting ambulance. Just before we were put in the ambulance I looked back at the car and I wondered how we survived the collision. A medic walked up to me and told me that we were lucky we had our seatbelts on because we probably wouldn't be alive if it weren't for them being fastened. I sure am thankful that Brent made me put mine on.



If a seatbelt law could save only one life, I think it would be worth it all.

A1C Ricky W. Money, USAF
Brooks AFB, TX 78236

FROM ANOTHER MOTORCYCLIST

I read the "Have You Ever Met a Motorcyclist You Liked?" letter (Sep issue) from A.A. Stiff and he is a "classic biased automobile operator." His opinion seems to stem from a deep hatred of motorcycles. Ranking us bikers with "irritants" such as mosquitos is a trifle immature. I've been operating a motorcycle safely for over 13 years and the only "turkeys" I've seen are 99 out of a 100 times driving cars. We are constantly subjected to abuse by car drivers, politicians, and police. Sure you have bad apples in all walks (or rides) of life, but just because you happen to look for them doesn't mean everyone is one.

As far as helmets go, I think the rider should be the one to choose. Do you realize that the only helmets that are "tested" for safety are the medium-sized helmets? And nowhere has there been proof that a helmet actually reduced death statistics among motorcyclists. Now I do disagree with riding with improper shoes, pants, etc., but if a person wants to open himself up for the unforgiving revenge of pavement, it should be his or her right. "Let those who ride decide." Having children on motorcycles is another point. The rider has no control over that child's body if he has to have both hands to handle a "crisis stop."

Granted there are "turkeys" who abuse the cycle's size, speed and ability to move through traffic, but those are the people that eventually wind up statistics in the DOT log book. So please Mister Stiff, give us a chance to express our freedom. Because after all is said and done we are still humans. And please Mister Public, take an extra look when you enter a roadway and maybe you can see us, and give us our legal right to live and ride on our public streets and highways. Signed: Not a turkey.

Sgt B.R. McCaskill, USA
MacDill AFB, FL 33608

Please see the helmet articles in this issue for a better understanding of testing. There is overwhelming proof that helmets reduce fatalities in motorcycle accidents.

TOO VISIBLE?

The letter entitled "Motorcycle Conspicuity" in your July 1981 issue raised a couple of interesting points. The writer indicated that one's visibility, and presumably safety, could be enhanced by the installation of an after-market "headlight modulator."

My experience in spotting a bike equipped with a Q-H headlight and one of these gadgets indicates that it certainly does attract the eye, and as a more-or-less safety conscious biker, I considered installing one on my 400cc cafe bike.

After a little research into the subject, I elected not to install such a device, preferring instead to just run my Q-H headlight on highbeam. I thought you might find my rationale of some interest.

I had noticed that most California law-enforcement vehicles are not usually left on the side of the road with the overhead blue/red lights on, even when they have just pulled someone over for a citation. Under most circumstances they leave only an amber flasher on after stopping a car.

When I queried some officers about this practice I learned that a drunken driver has been known to "home-in" on the visually arresting lightbar, resulting in a potentially fatal rear-ender.

The parallels are obvious; the question is, can one be *too* visible?

Really enjoy your magazine . . . keep up the good work.

LT(jg) George R. Scott, USN
Napa, CA 94558

We have read that the blue/red flashers are going to disappear from police vehicles for several reasons, one being the large amount of energy they require.

THE SMART THING TO DO

I've got something to say to SrA Robert J. Cowan (Oct '81 issue) . . . HOORAY FOR YOU!!! I love it, I simply love it. It warms me to the heart to hear somebody stand up and say, "Put your helmet on and SURVIVE."

I'm on an island right now, and the majority of bikers I see are fools. When my daughter and I head back stateside and pick up our bikes (she's 12 and I'm not, and she rides a Yamaha 125 (strictly dirt!) and me, well, a 175 Yam does it for me), we'll both be wearing those beautiful NAVA helmets. Believe me, it's going to feel good to get back down to biking and the only way we know to do it is with helmets . . . only my opinion, but I want to keep enjoying myself; hospitals are just not for this lady.

Seriously, for every person riding with a helmet — be they rider/driver or passenger, dirt or street — I know you've got a better than even chance of living. It takes pride in your own body to keep what you've got . . . wear those helmets! It's the smart thing to do.

SSgt Dianne M. Rood, USAF
APO New York 09406

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AUTO FACTS

Rx for NO START CAR CARE

THE AMERICAN AUTOMOBILE ASSOCIATION BLAMES "BATTERY OR ELECTRICAL FAILURES" FOR THE MAJORITY OF STARTING FAILURES AND EMERGENCY ROAD-SERVICE CALLS.

BEFORE A NO-START RUINS YOUR DAY, GET A TUNEUP AND ELECTRICAL CHECK.

car care council